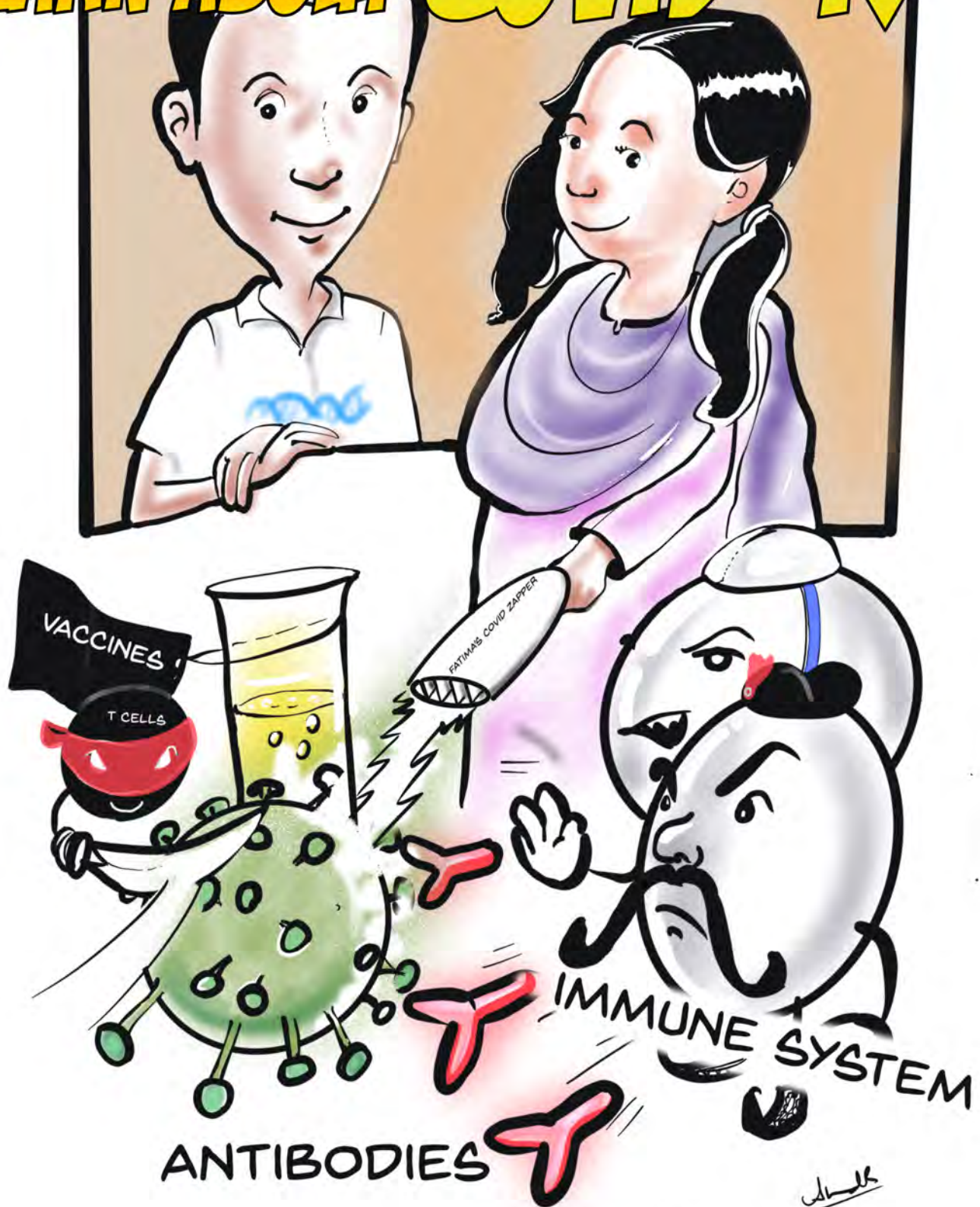


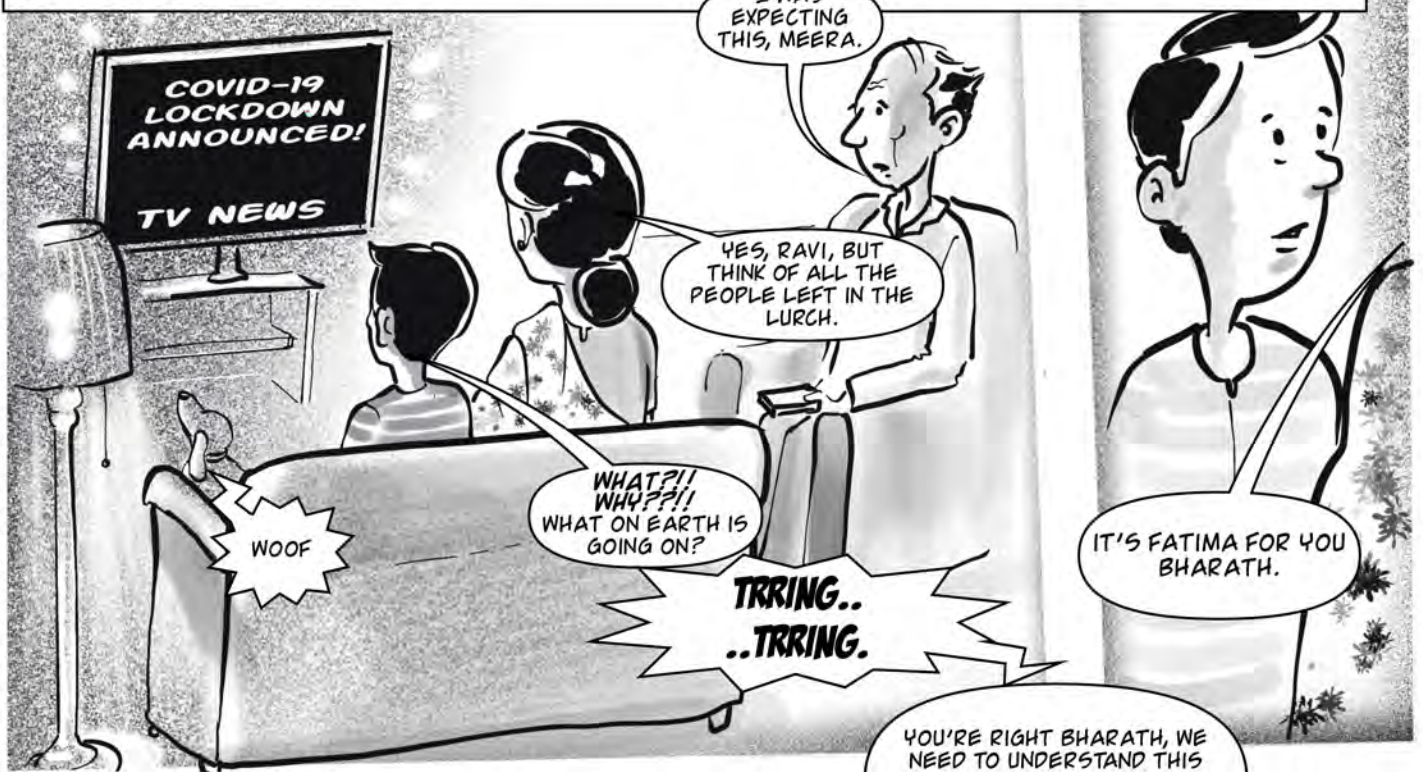
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BHARATH AND FATIMA LEARN ABOUT COVID-19



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ON A TUESDAY EVENING, BHARATH WAS WATCHING TV WITH HIS PARENTS, AND HIS DOG, BAHADUR, WHEN SUDDENLY...



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WHAT DO YOU MEAN?!

A VIRUS, BHARATH, IS NEITHER DEAD NOR ALIVE.



VIRUSES ARE INCREDIBLY TINY PARTICLES, YOU CAN FIT 600000000000 OF THEM ON A GRAIN OF RICE !! THE VIRUS THAT CAUSES COVID-19 IS CONTAINED IN AN ENVELOPE OF SPECIFIC PROTEINS AND FAT, WITH AN RNA CODE INSIDE.



IT DOESN'T HAVE ENOUGH GENES TO SURVIVE ON ITS OWN. IT NEEDS TO LIVE IN OTHER ORGANISMS TO SURVIVE AND REPRODUCE.

THAT MUST BE WHY IT INFECTS US - TO USE OUR GENES. BUT HOW DOES IT FIND US IF IT ISN'T ALIVE??



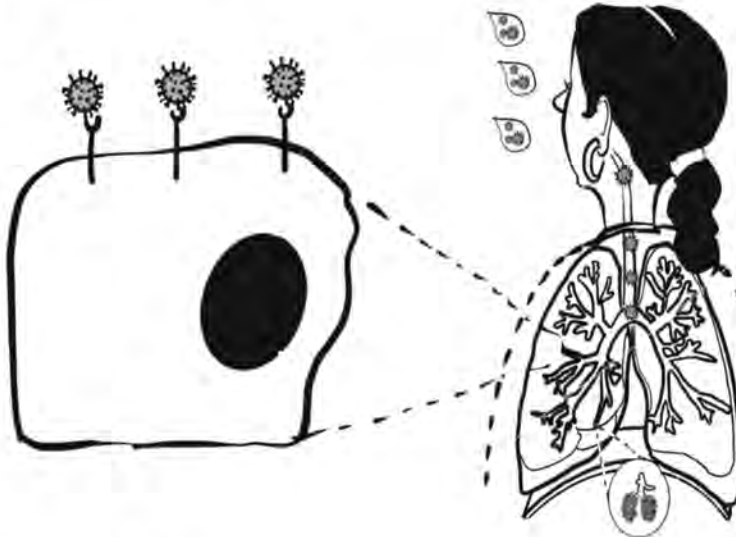
GOOD QUESTION, YOU CATCH IT IF FOR INSTANCE A SNEEZE PROJECTILE LANDS ON YOU OR SOMETHING YOU TOUCH.

A SNEEZE PROJECTILE! YOU MEAN SNOT! THAT'S GROSS RAMAN UNCLE!

HAHA!

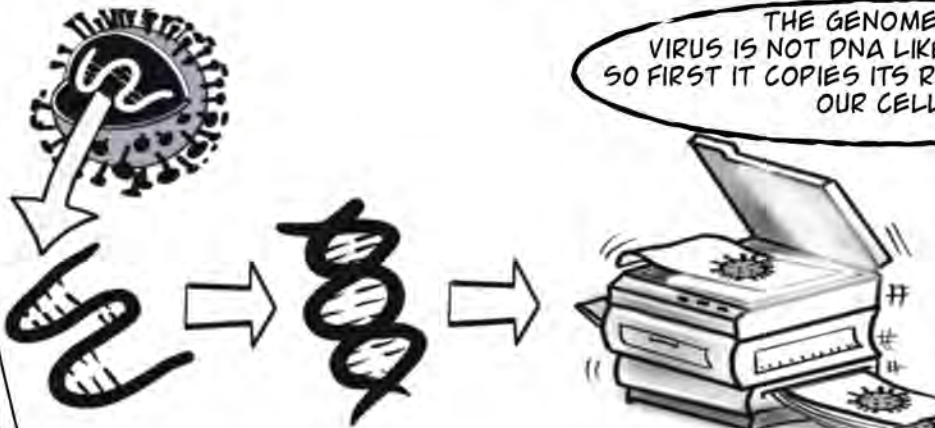
THEN WHAT HAPPENS UNCLE RAMAN?

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WELL... IT
MAKES ITS WAY
INTO YOUR LUNGS
AND STICKS TO YOUR
CELLS THERE.
ONCE IT'S DONE
THAT, IT CAN INJECT
ALL OF ITS GENETIC
MATERIAL INTO
YOUR CELLS.

THE GENOME OF THIS
VIRUS IS NOT DNA LIKE OURS BUT RNA.
SO FIRST IT COPIES ITS RNA INTO DNA USING
OUR CELLS.



YOUR
CELLS DON'T
REALIZE THAT THIS
RNA IS NOT YOURS,
AND CHURNS OUT LOTS
OF COPIES OF IT.
AND VOILA! FROM ONE
VIRUS, YOUR CELLS
HAVE HELPED THE
VIRUS MAKE
THOUSANDS
MORE.

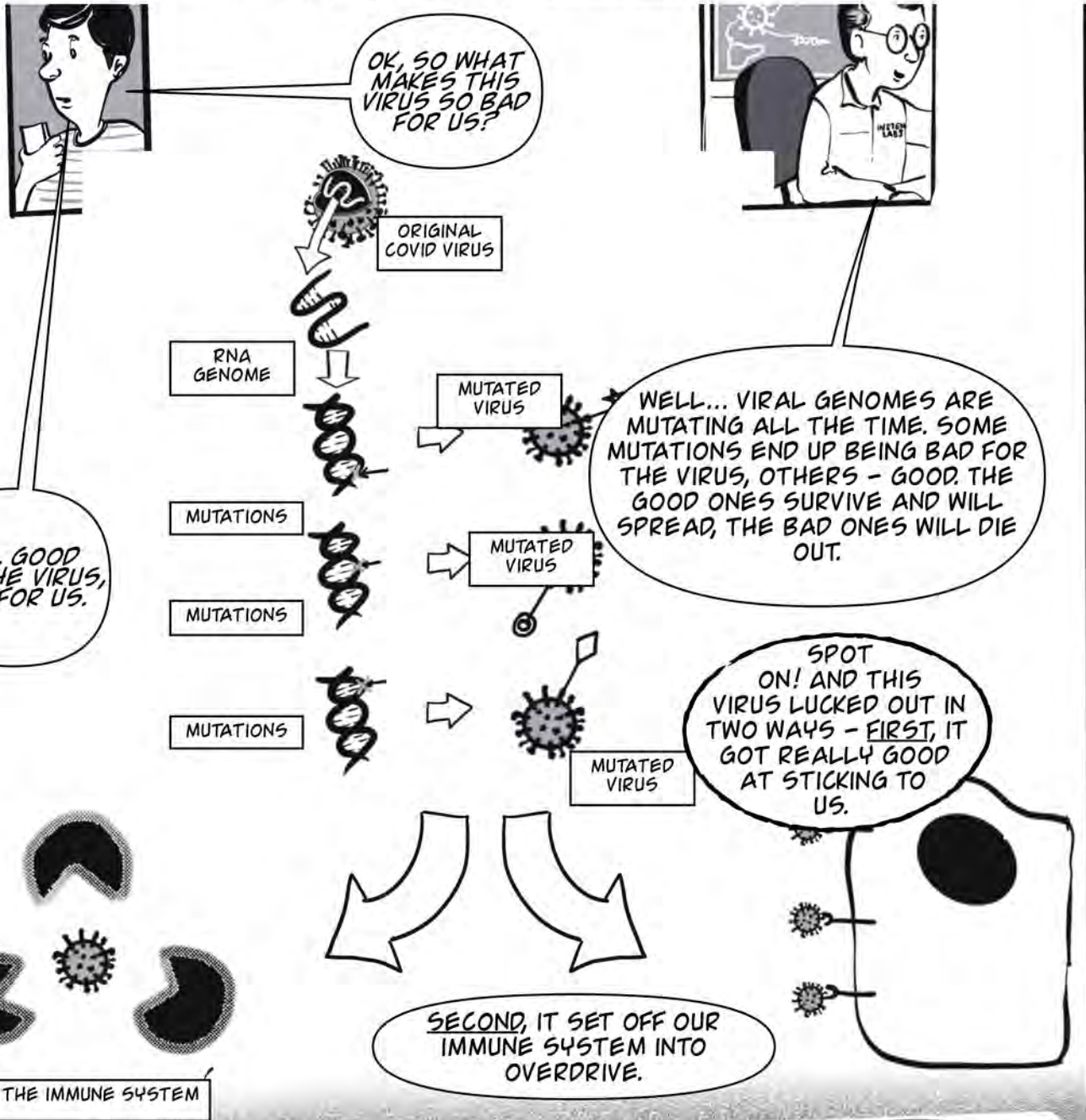


NOT INTENTIONALLY
BHARATH. IT'S JUST BIOLOGY. WE'RE ALL
CREATURES TRYING TO SURVIVE. BESIDES, WE LIVE WITH
VIRUSES ALL AROUND AND WITHIN US. AND WE DON'T EVEN
NOTICE THEM MOST OF THE TIME.

THAT IS DEVIOUS
UNCLE RAMAN!



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WAIT! SHOULDN'T THAT BE A GOOD THING? AND HOW DOES IT SET OFF THE IMMUNE SYSTEM?

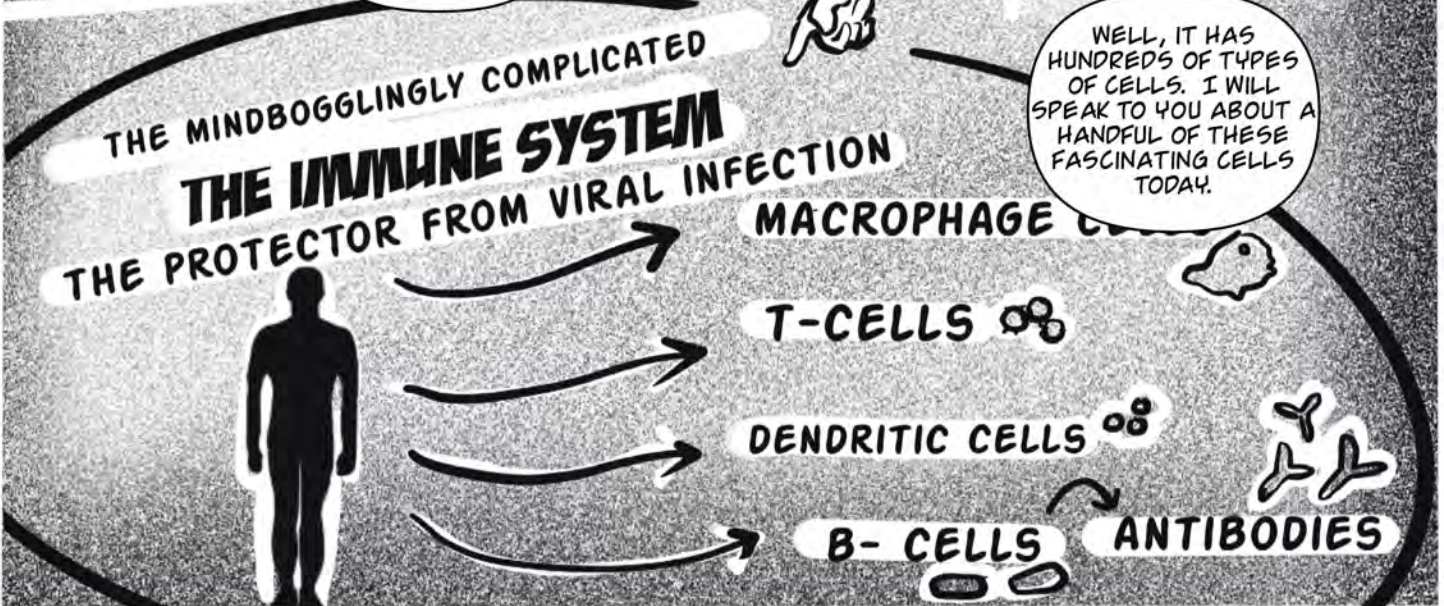
GOSH, THAT'S RIGHT! WE HAVEN'T SPOKEN ABOUT THE IMMUNE CELLS! LET'S SAVE THAT FOR THE NEXT SESSION, SHALL WE? ISN'T IT DINNER TIME ALREADY?

THAT'S TRUE. APPA'S BEEN CALLING US FOR DINNER. CAN WE SPEAK AGAIN TOMORROW?

WOOF!

YES! GIVE MY LOVE TO APPA, AMMA AND BAHADUR.

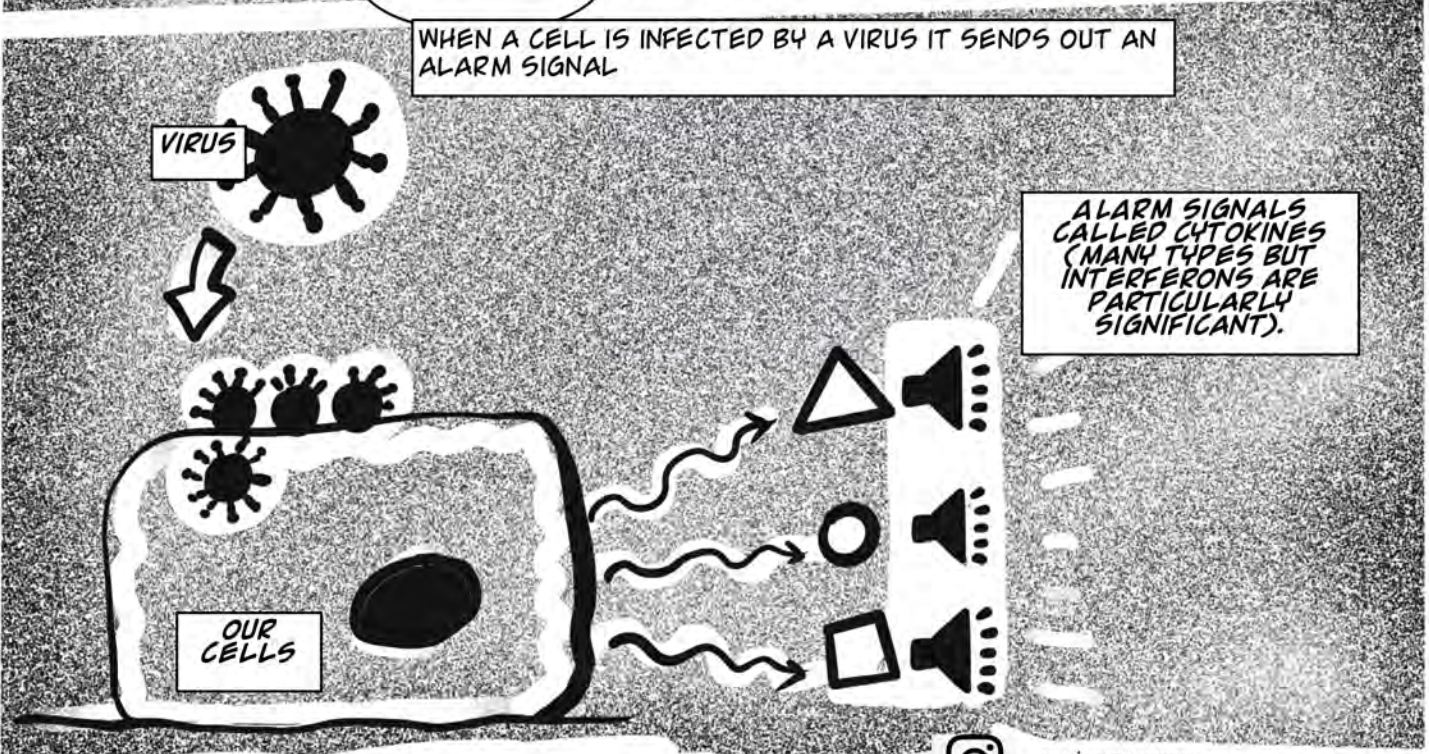
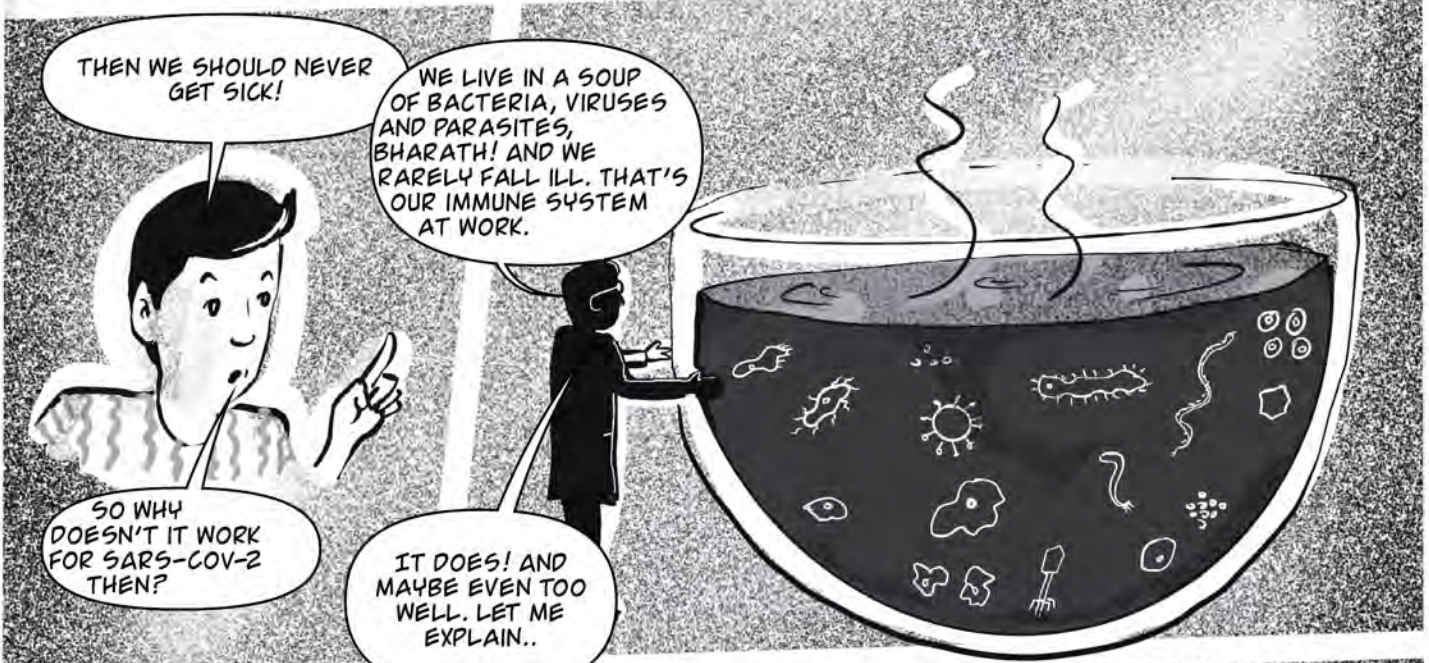
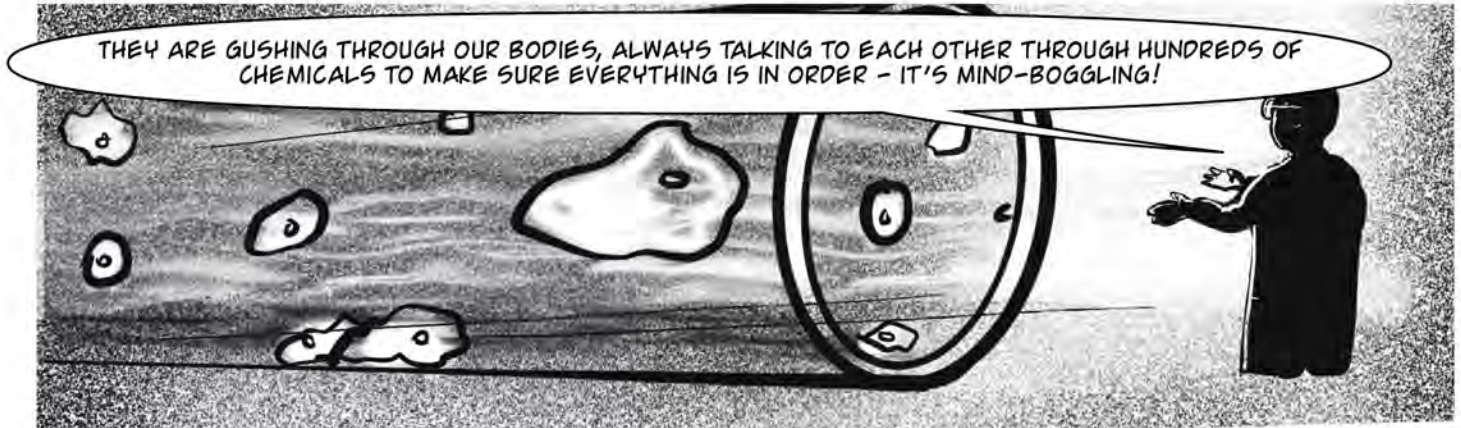
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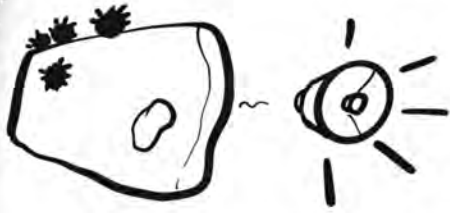
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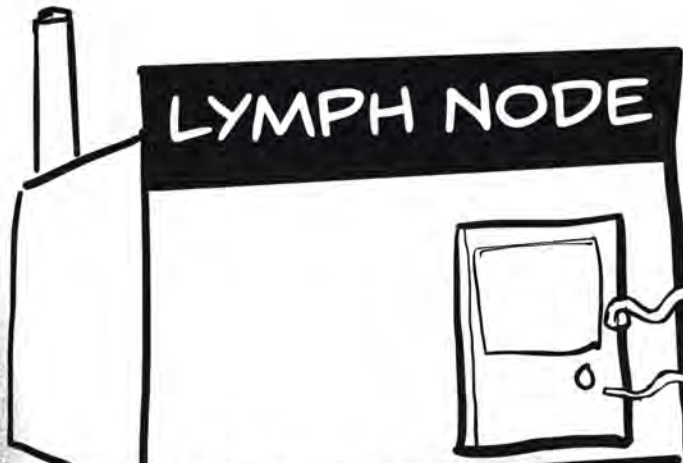
SOME IMMUNE CELLS ARE ON PATROL... ALWAYS ON THE LOOK-OUT FOR THESE SIGNALS.



AS SOON AS THEY SNIFF THE SIGNAL, THEY RUSH TO THE SPOT AND CHOMP UP THE INFECTED CELL

DENDRITIC CELL

THERE'S A SECOND TYPE OF PATROL CELL [DENDRITIC CELL] THAT QUICKLY TAKES A SAMPLE OF ALL THE CHOPPED-UP BITS OF VIRAL PROTEINS AND RUSHES OFF TO A VERY SPECIAL PLACE - THE LYMPH NODE.



DENDRITIC CELL



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WHAT'S SO SPECIAL ABOUT LYMPH NODES? WHERE ARE THEY?



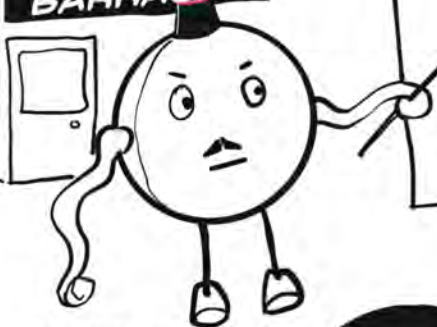
ALL OVER YOUR BODY - IN YOUR THROAT AND YOUR ARMPITS, FOR EXAMPLE. AND THEY ARE SPECIAL BECAUSE THAT'S WHERE ANTIBODIES ARE MADE.



I KNOW WHAT ANTIBODIES ARE. THEY FIGHT INFECTIONS!

THAT'S RIGHT. BUT THERE'S SOMETHING MORE SPECIAL ABOUT THEM - THEY REMEMBER YOUR PAST INFECTIONS AND FIGHT THOSE. LET ME TELL YOU HOW.

T CELL BARRACKS



DENDRITIC CELL

ENEMY



SELF



WHEN THE DENDRITIC CELLS RUSH OFF TO THE LYMPH NODES CARRYING BITS OF VIRAL PROTEINS WITH THEM, THEY GO FIND THEIR BUDDIES, THE T-CELLS.

KILLER T CELL

KILLER T CELL

KILLER T CELL



DENDRITIC CELLS HAVE BEEN TRAINING T-CELLS TO DISTINGUISH SELF FROM INFECTIONS BY BRINGING THEM SAMPLES OF PROTEINS. SO T-CELLS RAISE MORE ALARM BELLS ONLY WHEN THEY SEE A FOREIGN PROTEIN.

KILLER T CELL



THE T-CELL CALLS ON A FEW OF ITS BUDDIES. FIRST, IT SETS THE KILLER T-CELLS INTO ACTION. IT SHOWS THESE GUYS THE BITS OF VIRAL PROTEINS TO LOOK OUT FOR AND SENDS THEM OUT INTO YOUR BLOOD WITH THE INSTRUCTION: IDENTIFY AND ELIMINATE! THIS INCLUDES OUR OWN CELLS ONLY IF THEY ARE INFECTED.

CUT!

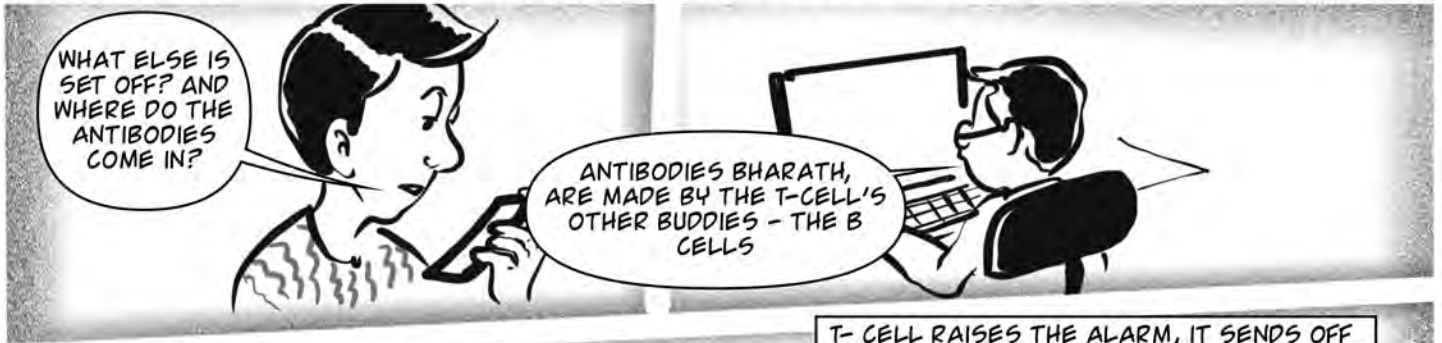
SLASH!



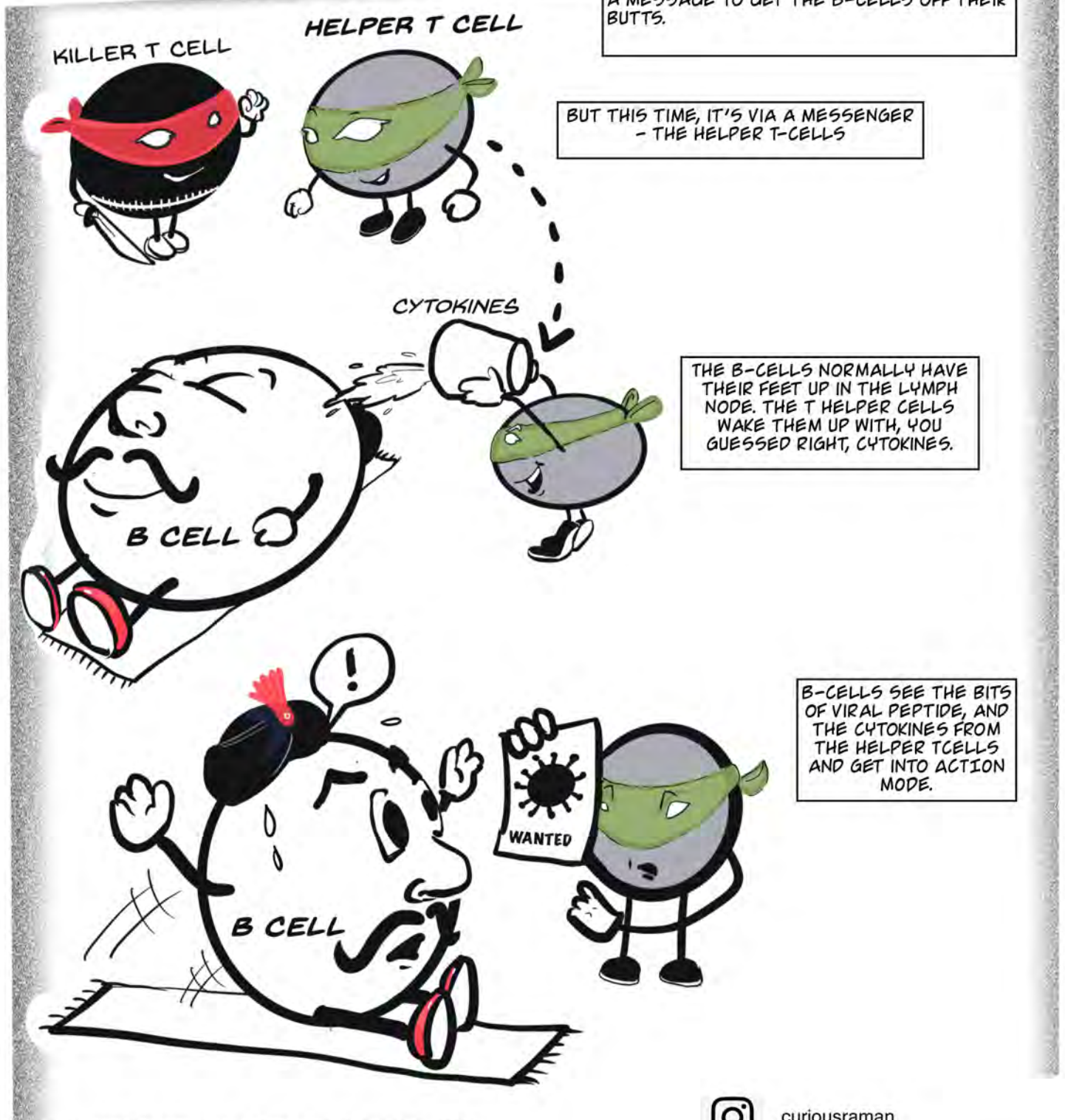
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T- CELL RAISES THE ALARM, IT SENDS OFF A MESSAGE TO GET THE B-CELLS OFF THEIR BUTTS.

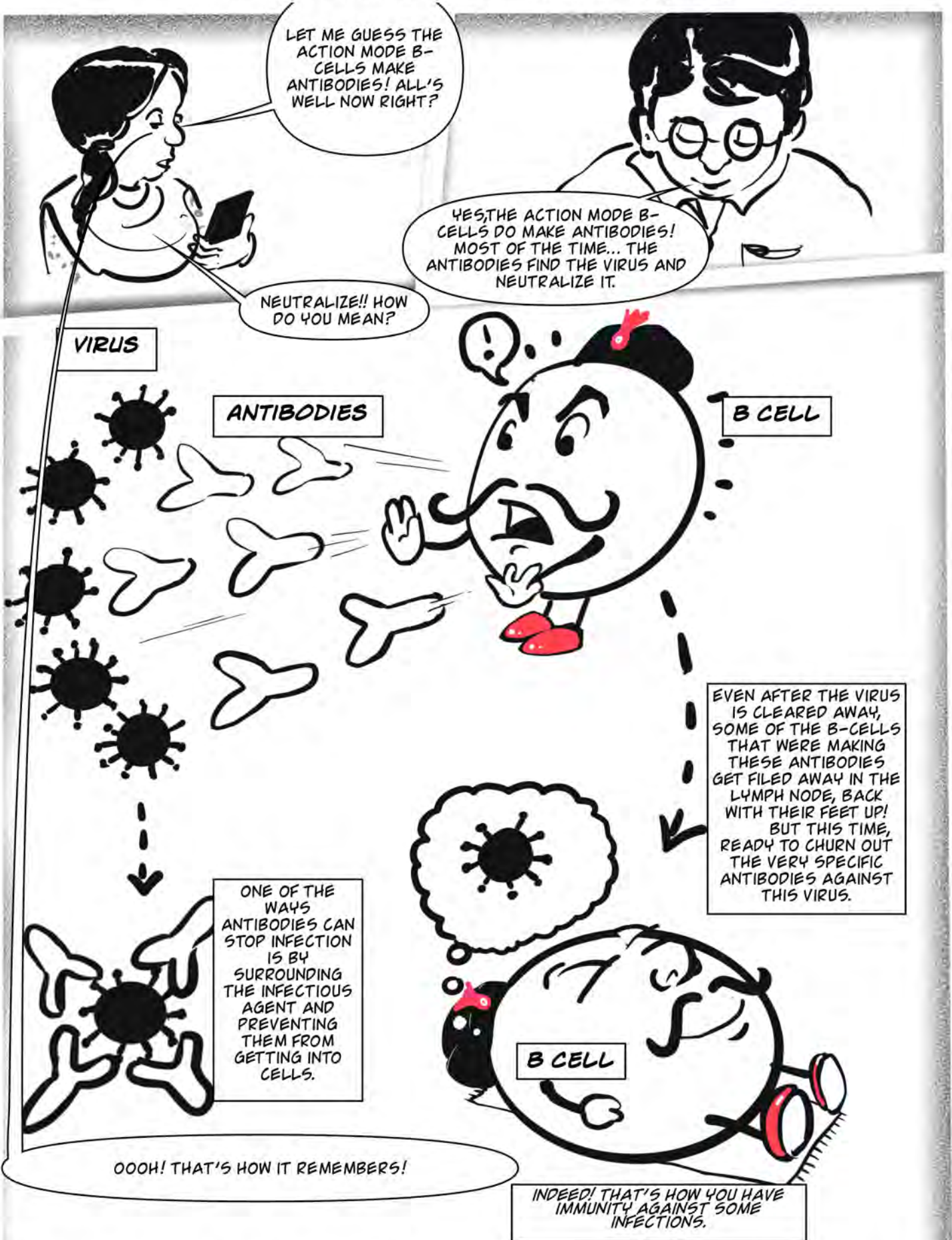


BUT THIS TIME, IT'S VIA A MESSENGER - THE HELPER T-CELLS

THE B-CELLS NORMALLY HAVE THEIR FEET UP IN THE LYMPH NODE. THE T HELPER CELLS WAKE THEM UP WITH, YOU GUESSED RIGHT, CYTOKINES.

B-CELLS SEE THE BITS OF VIRAL PEPTIDE, AND THE CYTOKINES FROM THE HELPER TCELLS AND GET INTO ACTION MODE.

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FATIMA, DID YOU NOT HAVE SOME IDEA YOU WANTED TO TELL ME ABOUT? AS A SCIENTIST I AM ALWAYS ALL EARS TO NEW ONES. MAYBE WE COULD EVEN WORK TOGETHER!

IT NEEDS SOME REVISIONS SO MAYBE I CAN TELL YOU ABOUT IT NEXT TIME? MY PARENTS ARE CALLING ME TO HAVE DINNER.

LET'S BREAK NOW, NEXT TIME WE WILL TALK MORE ABOUT VACCINES AND HOPEFULLY YOUR IDEA, FATIMA! BYE BOTH OF YOU, I WILL SPEAK TO YOU SOON.



curiousraman



@curiousraman @soniaqsen

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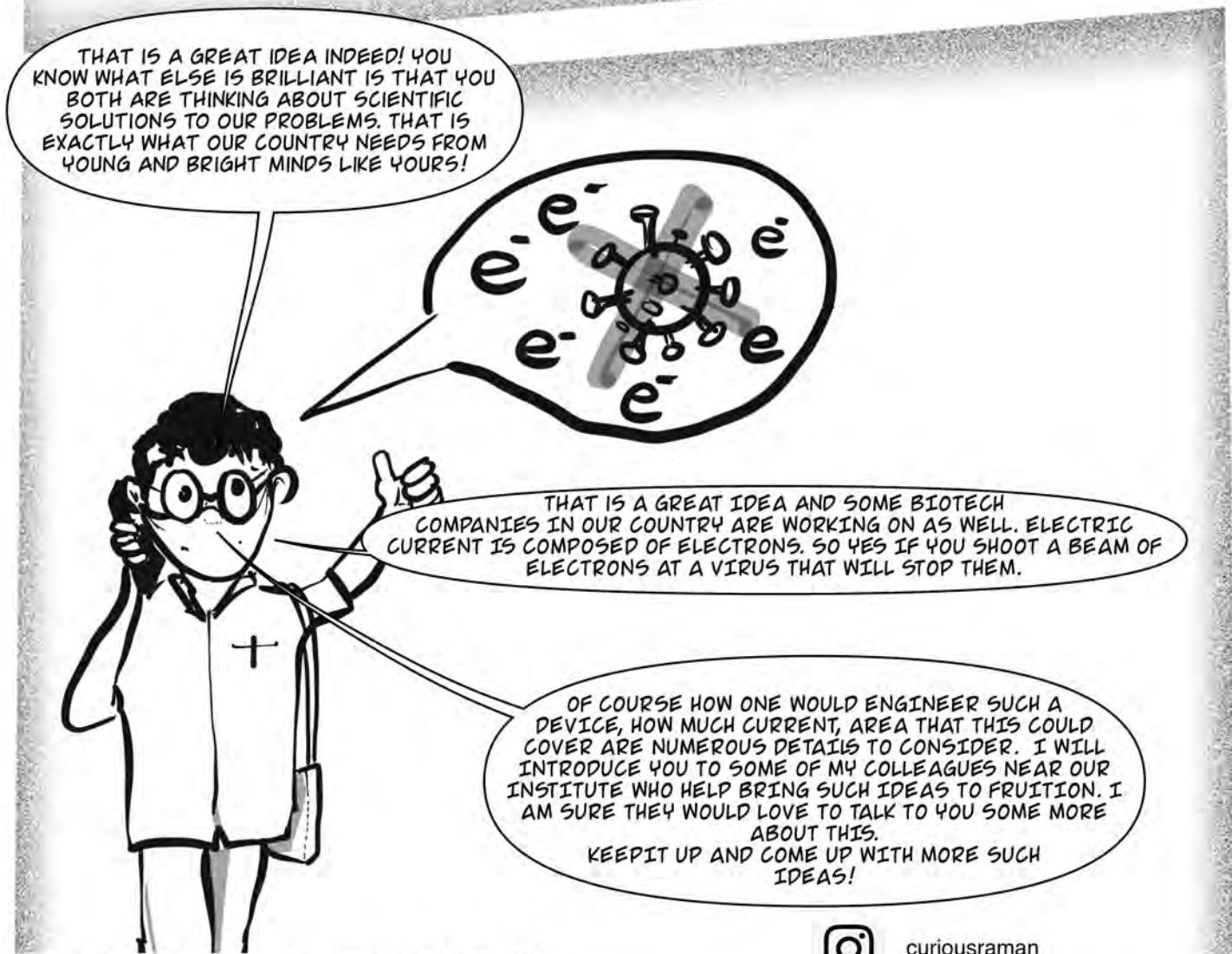
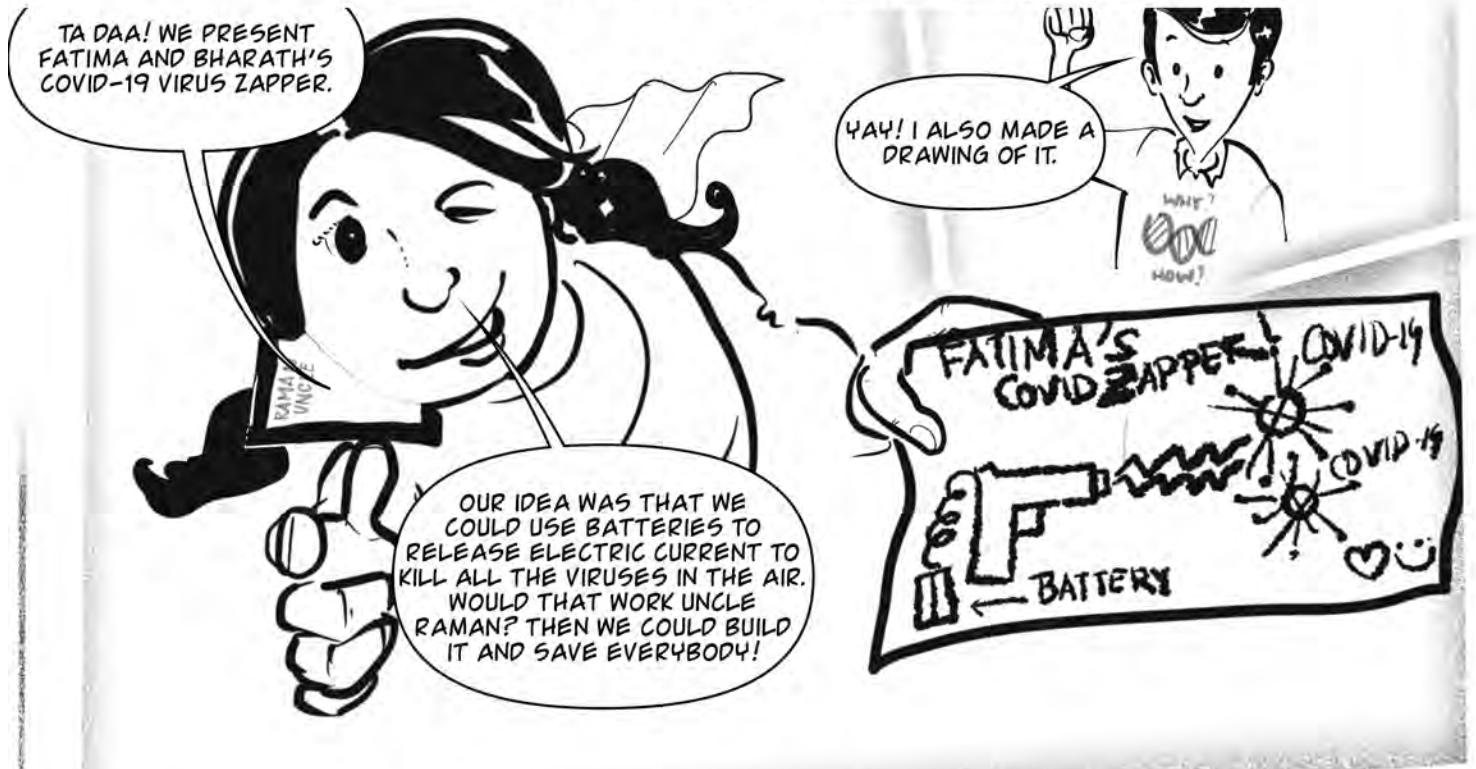
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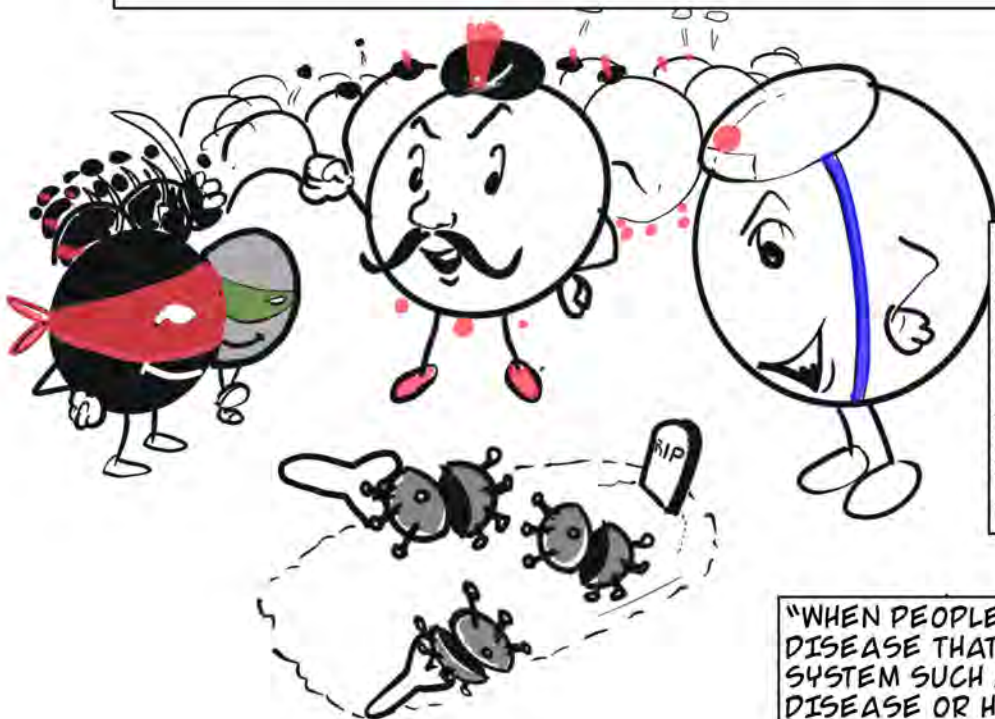
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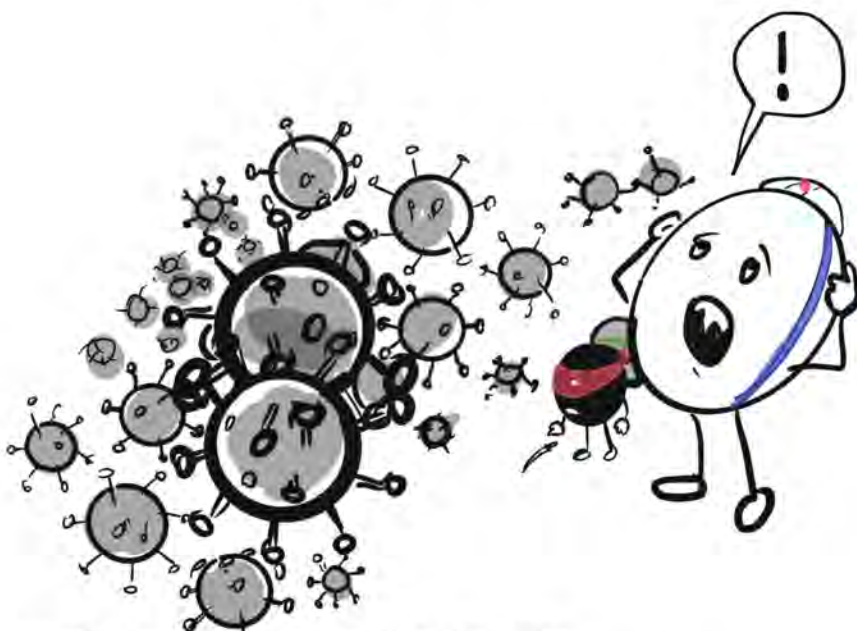
OK, LET'S NOW TRY TO ANSWER YOUR QUESTION ABOUT WHY PEOPLE GET SICK OF COVID INSPITE OF OUR IMMUNE SYSTEM

"THE LAST TIME WE CAUGHT A SMALL GLIMPSE OF OUR IMMUNE SYSTEM.. NUMEROUS DIFFERENT TYPES OF CELLS THAT HELP TO KILL VIRUSES"



"BUT SOMETIMES OUR IMMUNE SYSTEM IS NOT QUITE EFFECTIVE AGAINST INVADING PATHOGENS LIKE VIRUSES. ELDERLY PEOPLE HAVE WEAKER IMMUNE SYSTEMS AND THEREFORE ARE MORE VULNERABLE."

"WHEN PEOPLE SUFFER FROM DISEASE THAT WEAKEN THE IMMUNE SYSTEM SUCH AS DIABETES, LUNG DISEASE OR HEART DISEASE."



"IN SUCH CASES OUR IMMUNE SYSTEM IS UNABLE TO MOUNT AN EFFECTIVE IMMUNE RESPONSE AND IS OVERWHELMED BY THE RAPIDLY INCREASING NUMBER OF VIRUSES IN THE BODY."



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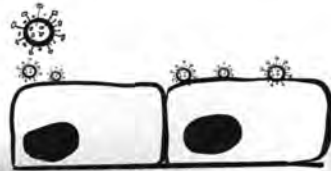
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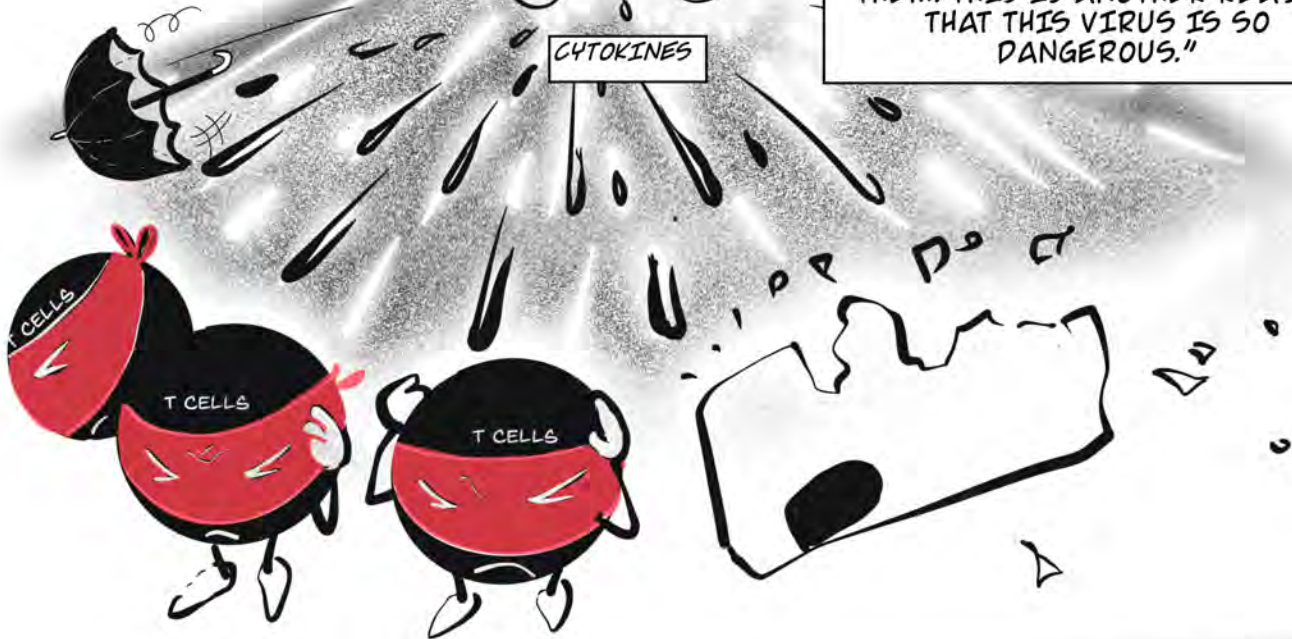
THERE IS ANOTHER REASON THAT THE VIRUS IS ABLE TO MAKE PEOPLE SICK. THIS IS THE OPPOSITE OF WHAT I JUST SAID ABOUT WEAKER IMMUNE SYSTEMS. HERE PEOPLE GET SICK BECAUSE OF A HYPER-ACTIVE IMMUNE SYSTEM. SCIENTISTS ARE NOT QUITE SURE WHY THIS HAPPENS, BUT THE TERM FOR THIS IS...

"...CYTOKINE STORM."



"WHEN THE VIRUS INFECTS OUR ORGANS SUCH AS THE LUNGS, THE CELLS IN THE LUNGS START SECRETING PROTEINS CALLED CYTOKINES THAT WE TOUCHED UPON THE LAST TIME. THESE CYTOKINES PRODUCED CHRONICALLY AND AT HIGH LEVELS NOW START DAMAGING OUR ORGANS INSTEAD OF HELPING THEM. THIS IS ANOTHER REASON THAT THIS VIRUS IS SO DANGEROUS."

CYTOKINES



SO HOW CAN WE STOP THIS STORM?



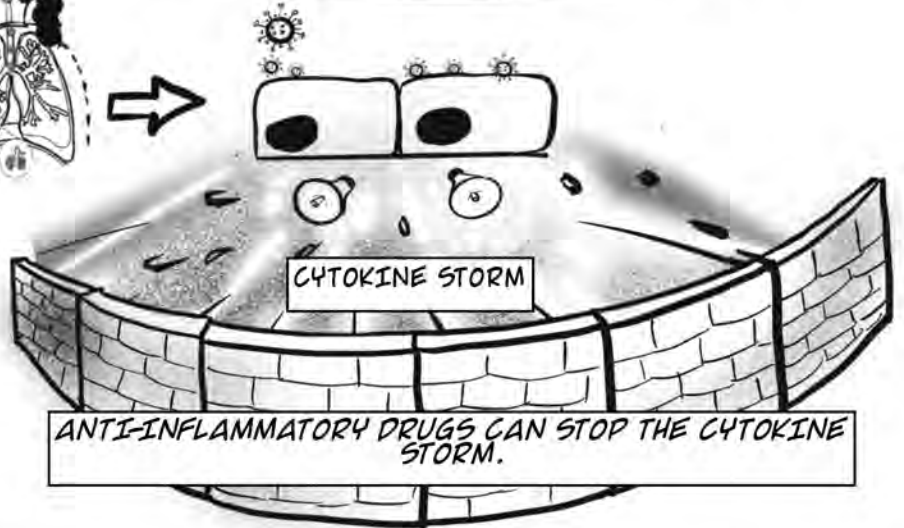
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WHEN WE BREATHE VIRUSES INTO OUR LUNGS, THE CELLS GET INFECTED SOMETIMES CAUSING THE CYTOKINE STORM. THERE ARE SOME DRUGS CALLED 'ANTI-INFLAMMATORY DRUGS' THAT ARE USED.



THERE ARE OTHER WAYS OF STOPPING CYTOKINES AS WELL, SUCH AS USING ANTIBODIES. WHAT ARE ANTIBODIES YOU ASK. WELL MAYBE IT IS TIME TO TALK ABOUT YOUR OTHER QUESTION...

"...VACCINES."

"THIS IS THE SOLUTION THAT THE SCIENTISTS AND MEDICAL PROFESSIONALS IN INDIA AND AROUND THE WORLD ARE WORKING HARD TOWARDS."



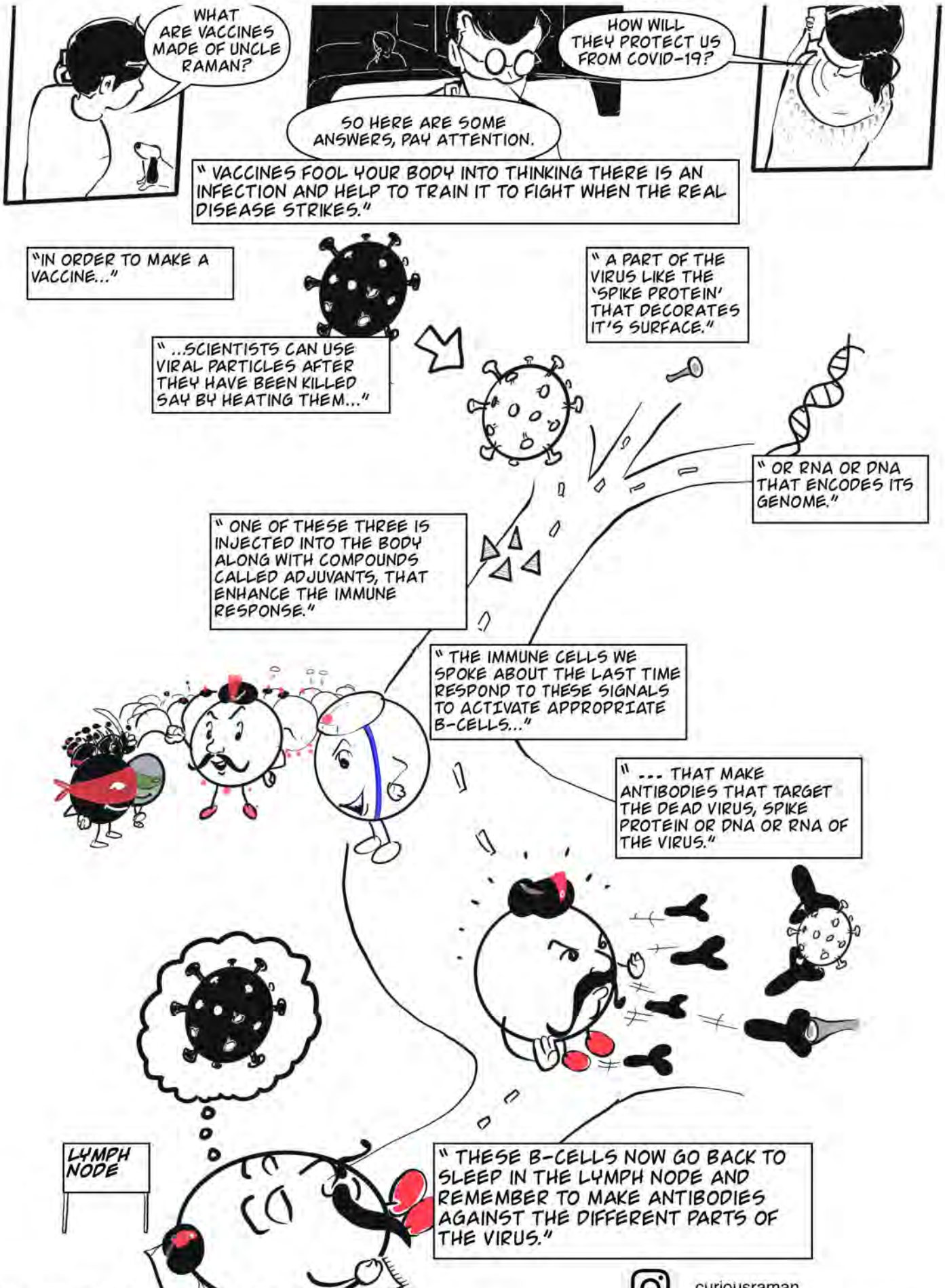
"YOU DID HEAR ABOUT THE GOOD NEWS THAT VACCINE CANDIDATES FROM THE US, UK, INDIA ARE NOW BEING TRIED IN PATIENTS. THE INITIAL RESULTS FROM SOME OF THESE TRIALS ARE QUITE POSITIVE."



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LYMPH NODE

HELPER-T CELL

ACTIVATED B CELL

" WHEN A PERSON IS INJECTED WITH A VACCINE THEIR IMMUNE CELLS ALREADY KNOW WHAT THE VIRUS 'LOOKS LIKE'. SO WHEN THE BODY IS INFECTED BY THE VIRUS, THE HELPER T-CELL CAN IMMEDIATELY WAKE UP THE RIGHT B-CELL WHICH CAN NOW QUICKLY MOUNT AN ANTIBODY RESPONSE AND ELIMINATE THE VIRUS BEFORE IT CAN DO FURTHER DAMAGE!"

" HOW LONG THE EFFECT OF THE VACCINE CAN LAST DEPENDS ON THE VIRUS. WE DO NOT KNOW HOW LONG THE VACCINE WILL BE EFFECTIVE AGAINST THE SARS-COV-2 VIRUS. WHETHER WE NEED TO TAKE IT EVERY YEAR OR EVERY FEW YEARS. BUT IN ANY CASE IT WILL BE GREAT FOR US HUMANS WHEN THE VACCINE IS READY SO WE CAN PROTECT OURSELVES!"

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"WHEN A VACCINE IS READY, THERE ARE NUMEROUS CHALLENGES AHEAD LIKE PRODUCTION OF A LARGE AMOUNT FOR ALL OF US. DID YOU KNOW INDIA MANUFACTURES ABOUT 60% OF THE WORLD'S VACCINE SUPPLY?"



"PLANNING FOR HOW MUCH IT WILL COST, AND HOW OUR GOVERNMENT WILL HELP WITH THESE COSTS FOR PATIENTS."

VACCINE MANUFACTURING



"ONCE MANUFACTURED IT HAS TO BE STORED APPROPRIATELY AND TRANSPORTED TO ALL CORNERS OF INDIA AND THE WORLD."



"FINALLY WHO WILL GET IT FIRST? IT WOULD MAKE SENSE TO GIVE THIS FIRST TO OUR SANITATION AND MEDICAL PERSONNEL WHO ARE AT THE FRONT LINES OF THE BATTLE AGAINST COVID-19."

THESE ARE QUESTIONS I AM NOT AN EXPERT IN. BUT WE CAN SPEAK WITH SOME OF MY COLLEAGUES WHO KNOW MORE ABOUT THIS ANOTHER TIME. LET US CONCLUDE THE DISCUSSION FOR TODAY. ITS TIME FOR DINNER. GREAT SPEAKING WITH YOU BOTH AS USUAL!

THANKS UNCLE RAMAN.



WE BOTH LEARNT A LOT, GOOD NIGHT!



THE END



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